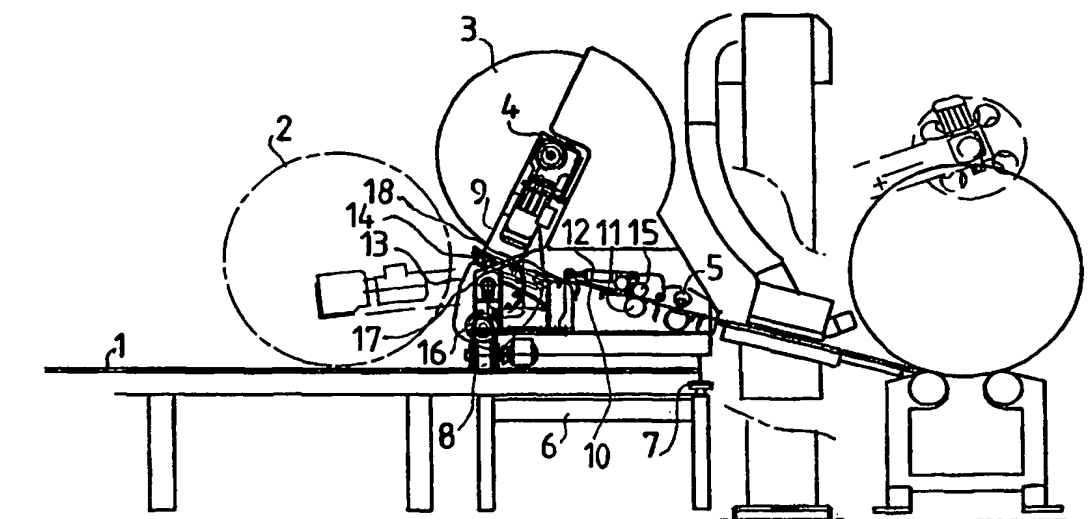




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(21) International Application Number: PCT/FI99/00281 (22) International Filing Date: 1 April 1999 (01.04.99) (30) Priority Data: 980751 1 April 1998 (01.04.98) FI (71) Applicant (for all designated States except US): VALMET CORPORATION [FI/FI]; Panuntie 6, FIN-00620 Helsinki (FI). (72) Inventors; and (75) Inventors/Applicants (for US only): FORSSTRÖM, Risto [FI/FI]; Naavakatu 27, FIN-15950 Lahti (FI). MIELONEN, Eero [FI/FI]; Ripistönkatu 27, FIN-15300 Lahti (FI). (74) Agent: SEPPO LAINE OY; Itämerenkatu 3 B, FIN-00180 Helsinki (FI).		(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i>

(54) Title: METHOD OF AND ARRANGEMENT FOR THREADING OF A WRAPPER WEB INTO A NIP BETWEEN DRAWING ROLLS IN A WRAPPING DEVICE

**(57) Abstract**

Method of and arrangement for threading of a wrapper end (31) from a wrapper roll (3) to a nip between wrapper proportioning drawing rolls (11, 15) in a wrapping station for wrapping paper rolls, board rolls and pulp rolls, in which the prepared wrapper roll (3) is rotated in a use station in the direction opposite to the wrapper feeding direction in such way that the wrapper end (31) falls on a wrapper feeding table (10). The wrapper end (31) that has fallen on the wrapper feeding table (10) is indicated and the rotating motion of the wrapper roll is stopped when the wrapper end (31) has been detected. Now the roll (3) is rotated in the wrapper feeding direction, until the wrapper end (31) passes an indicator placed after the drawing rolls.

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Method of and arrangement for threading of a wrapper web into a nip between drawing rolls in a wrapping device

- 5 The invention concerns a method as defined in the preamble of claim 1 for threading the end of a wrapper web from a wrapper roll into a nip between wrapper proportioning drawing rolls.

Further, the invention concerns an arrangement for applying the method.

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- Getting a modern wrapping machine and roll wrapping device ready for operation usually requires the input of at least two operators. Using older equipment, getting it ready for operation and changing the wrapper rolls can be even harder. One of the most time-consuming and care-requiring tasks is the threading of the wrapper web from a new roll brought to the wrapping device into the nip between the wrapper proportioning drawing rolls. The wrapper has to remain straight during the feeding and the nip between the drawing rolls has to be closed in such way that both edges of the wrapper are of the same length between the roll and the drawing roll nip. In this way a uniform transverse tension of the wrapper is achieved. Since the positions of the wrapper roll and the drawing roll are invariable with respect to each other, a wrapper that has been positioned askew cannot straighten out in the drawing roll nip, except by wrinkling before the drawing roll nip, and the wrinkle goes through the nip. Further, if the transverse tension of the wrapper isn't uniform, the tension of the wrapper that is to be wrapped around a roll will become nonuniform and the wrapping quality will suffer, because a loose wrapper layer will not support the roll sufficiently. A uniform wrapper tension is of particular significance to the quality of the wrapping in the so-called multiple wrapping, where several parallel rounds of wrapper are wrapped around a roll.

- 20 25 30 The object of the present invention is to provide a method for threading the wrapper automatically and reliably with a wrapping device from the wrapper roll to the nip between the wrapper proportioning drawing rolls.

The invention is based on that a prepared roll positioned ready for use is rotated against the feeding direction, whereupon the free wrapper end arrives on the

wrapper feeding table and can be indicated. When the wrapper end has been detected, the direction of rotation of the wrapper roll is changed and the wrapper is advantageously fed by blowing air to the nip between the drawing rolls and the nip is closed.

5

More precisely, the method in accordance with the present invention is characterized in what is presented in the characterizing part of claim 1.

10 The arrangement in accordance with the present invention is, for its part, characterized in what is presented in the characterizing part of claim 6.

Considerable advantages are achieved by means of the present invention.

15 The most significant advantage of the invention is that the end of the wrapper can be threaded to the drawing roll nip automatically and very reliably. The wrapper doesn't need to be threaded by hand at any stage and the wrapper is always guided by the machine straight forward, whereupon the wrapper arrives straight to the drawing roll nip and its transverse tension will become uniform when the drawing roll nip is closed. Thanks to the automatic and reliable guiding the number of possibilities for
20 errors in connection with the changing of wrapper rolls will decrease, by which the quality and reliability of the functioning of the entire wrapping system can be influenced. This makes the work of the wrapping machine operators easier, enabling them to concentrate on the matters that are the most essential ones for the functioning of the system and on the quality control of the rolls that are to be
25 wrapped.

In the following, the invention will be described in more detail with reference to the figures in the accompanying drawing.

30 Figure 1 is an illustration of a device in accordance with the invention seen from above.

Figure 2 is an illustration of a device in accordance with Figure 1 seen from the side.

Figures 3a - 3c are schematic illustrations of threading of the wrapper end in accordance with the invention.

In Figs. 1 and 2 there are shown members for feeding a wrapper from a wrapper roll to wrapper handling members of a wrapping machine. These devices are positioned in connection with wrapping devices, which roll the wrapper around a roll that is to be wrapped. The wrapping device and its support rolls are shown referentially. The rolls that are to be wrapped are brought on a conveyor to a wrapping station and a roll is placed on the support rolls by changing the height between the conveyor and the support rolls, after which the roll is rotated on the support rolls and the wrapper is wrapped around the roll.

With respect to the support rolls, on the opposite side of the wrapping station there is a storage table 1 for storing wrapper rolls 2 of various sizes. In this embodiment there is one pick-up station 26 on the storage table and on both sides of it delivery stations 27. At each station is shown a roll 2, 25. The wrapping station is set up on a frame structure 6 and wrapper proportioners, i.e. a wrapper carriage and a roll in use 3, have been positioned on their one side on rails 7 which are parallel to the roll that is to be wrapped and on their other side on an electric motor -driven drive gear 8. The position of the wrapper feeding devices is controlled by an absolute sensor, which is placed on the drive gear shaft. This wrapper roll handling device is intended for the kind of wrapping station applications in which the roll that is to be wrapped can be wrapped in several parallel rounds of wrapper using a wrapper that is narrower than the roll that is to be wrapped. In this kind of device it has to be possible to move the wrapper feeding device in line with the longitudinal axis of the roll that is to be wrapped, in the way that is shown with arrows in Fig.1.

The wrapper proportioners comprise swinging arms 9 for supporting the wrapper material roll 3, below the roll 3 the first part 10 of a wrapper feeding table, in connection with which there are placed conventional drawing rolls 11, 15 for feeding the wrapper and a cross cutting device 5 for cutting the wrapper. The first part 10 of the wrapper feeding table inclines down and at its bottom end after the cross cutting device 5 there is the second part of the feeding table, which continues to the support roll that is on the side of the wrapping station. In the first part 10 of the wrapper

feeding table there are air nozzles 28 for forming a stream of air along the surface of the table 10 downwards and sensors 29 for detecting the wrapper end. After the drawing rolls 11, 15 there is also a sensor 30 for indicating the wrapper end.

5 The wrapper is fed from the first part 10 of the wrapper feeding table along the second part to the roll that is to be wrapped. The drawing rolls 11, 15 have been placed in such way that the upper edge of the roll 11, which is under the first part 10 of the wrapper feeding table, is approximately on the same level as the table 10 and the roll 15, which is above the table, has been placed to press against the roll 11
10 below, guided by a cylinder 12. With the cylinder 12 a sufficient pressure is achieved between the rolls 11, 15 for drawing the wrapper and by means of it the nip between the rolls 11, 15 can be opened while the wrapper end is being threaded. The drawing rolls are driven by a motor 21 and the cross cutting device is driven by a motor 22.

15

The swinging arms 9 have been arranged to swing supported by end plates 13 towards the storage table around a shaft 17. A toothed segment 18 and an electric gear motor 16 equipped with a toothed wheel, which function in connection with each other, have also been attached to the end plate 13. At the opposite end, with
20 respect to the end plate of the other swinging arm 9, there is an electric gear motor 4 for rotating the wrapper roll 3. On the shaft of the gear motor 4 there is a spindle 19, the end of which is conical-shaped. At the end of the opposite arm there is a freely rotating similarly shaped spindle 23. In the centre of the spindle 19, which is attached to the gear motor 4, there is a mirror 20 and in the centre of the freely
25 rotating spindle 23 there is a photo cell 24. The spindle arms 9 have been fastened to the end plates 13 through rails 14 in such way that the arms can move regarding the wrapper roll 2.

Collecting a new wrapper roll 2 happens with the device described above as follows.
30 When the wrapper roll 3 used at the wrapping station is finished or when there is too little wrapper left on the roll for a complete wrapping, the old roll or the roll core has to be removed. After this, a new roll is collected. When the old wrapper roll 3 has been removed, the swinging spindle arms 9 are driven to the open-position on the rails 14 and the wrapper carriage is moved to the pick-up station 26 of the new roll 2.

The detectors placed in the carriage indicate the exact place of the roll 2 and that there are no extra rolls in the pick-up area. Next, the spindle arms 9 are turned towards the wrapper roll 2 that is to be collected. The wrapper roll 2 has to be positioned in such way that its centre hole is on the path of the swinging spindle arms 9. The centre hole has to be so precisely on the path of the spindles 19, 23 that their conical sections can be pushed into the centre hole. The spindles have the photo cell - mirror pair 20, 24, which gives a signal when the spindles 19, 23 arrive at the centre hole. Therefore, using this method, the centre hole of the roll has to be free and non-plugged so it can be detected. If the centre hole can't be found, an error message will be given. The spindle arms 9 are now driven on the rails 14 towards the roll 2 and the absolute sensor indicating their movement measures the distance of the spindle arms 9 from the end of the roll 2. When the reading of the absolute sensor indicates that the conical sections of the spindle arms are at least partially in the centre hole, the brake holding the swinging spindle arms 9 in place in the swinging direction and the brakes affecting the sideways position of the spindle arms are released, whereupon the spindle arms 9 and the spindles 19, 23 position themselves freely with respect to the centre hole. When the distance detector indicates that the spindle arms are attached to the ends of the roll, the roll can be lifted up to its use station.

If a change of the width or of the quality of the wrapper is desired, the wrapper roll in use has to be lowered away from the use station and a new roll has to be collected to replace it. The changing is done in such way that at first, the wrapper part that is on the feeding table 10 is rolled back around the roll. Then the wrapper carriage is driven to the changing position 27 that has been defined in beforehand and the sensors are used to check whether the area is free. If the changing area is free, the partly used roll is lowered to the changing position. The swinging arms can now be moved to the open-position by moving them away from the roll. Then the spindle arms are lifted and the wrapper carriage is guided to the pick-up station of the new roll. Collecting the new roll happens as described above.

According to the present invention, the wrapper end 31 is threaded to the nip between the drawing rolls 11, 15 in the way that is shown in Figs. 3a - 3c. The roll 3, which has been collected to the use station as described above, has been prepared,

i.e. its pacsupport has been removed and the wrapper end 31 has been released and cut in the specified shape. When the wrapper roll 3 has been lifted to the use station, the end 31 hangs down from the roll 3 as shown in Fig. 3a on the opposite side of the wrapper roll 3 with respect to the wrapper feeding table 10. Now, the roll 3 is rotated according to the arrows in Fig. 3a against the wrapper feeding direction, whereupon the wrapper end 31 goes round the roll 3 and falls on the wrapper feeding desk 10 as shown in Fig. 3b. At the same time as the roll is being rotated air is blown from the air nozzles 28 along the surface of the feeding table 10 and the stream of air moving on the surface of the table sucks the wrapper end 31 against the table. Thus the wrapper end 31 is detected by the sensor 29 and the wrapper roll 3 is stopped and its direction of rotation is changed to the direction of rotation of the wrapper in accordance with the arrow in Fig. 3c. Now the rotating motion of the roll 3 feeds the wrapper along the feeding table 10 and the air blown from the air nozzles 28 feeds the wrapper forward and keeps the wrapper on the surface of the table 10 and straight. When the wrapper end passes the drawing rolls 11, 15, it is detected by the sensor 30 and the nip between the drawing rolls 11, 15, which has been open, can be closed. The wrapper has now been threaded in its place and the wrapping station is ready for operation.

It is understood that the present invention is also suitable for other types of wrapping stations besides the one described above. The method is suitable e.g. for the kind of wrapping stations that have several stations for wrapper rolls. The types and positions of the sensors and air nozzles in the wrapper feeding table can vary according to the structure of the wrapping station that is used. Air doesn't have to be blown continually during the reverse rotating motion of the wrapper roll, but if the blowing is started before the wrapper end comes to the wrapper feeding table, it is more certain that it will be detected. It is also conceivable that with some wrapper qualities the air blowing is not used at all, but in that case the wrapper has to be slack enough to fall straight on the wrapper feeding table and yet stiff longitudinally so it can be fed by the rotating motion of the roll.

Claims

1. A method of threading a wrapper end (31) from a wrapper roll (3) to a nip
between wrapper proportioning drawing rolls (11, 15) in a wrapping station
5 intended for wrapping paper rolls, board rolls and pulp rolls, **characterized of**
- rotating a prepared wrapper roll (3) in a use position against the
wrapper feeding direction in such a way that the wrapper end (31)
falls on a wrapper feeding table (10),
10
- indicating the wrapper end (31) that has fallen on the wrapper
feeding table (10) and stopping the rotating motion of the wrapper roll
when the wrapper end (31) has been detected, and
- 15 - rotating the roll (3) in the feeding direction of the wrapper, until the
wrapper end (31) passes an indicator placed after the drawing rolls.
2. A method as claimed in claim 1, **characterized** of blown air along the surface
of the wrapper feeding table (10) for attaching the wrapper end (31) and for
20 guiding it along the surface of the wrapper feeding table (10).
3. A method as claimed in claim 2, **characterized** in that the air blowing is
started before the wrapper end (31) is indicated on the wrapper feeding table
(10).
25
4. An arrangement for threading a wrapper end in a wrapping device intended
for wrapping paper rolls, board rolls and pulp rolls, comprising
- 30 - at least one use position, in which a prepared wrapper roll (3) can be
placed for feeding the wrapper by wrapper feeding means (11, 15) to
a roll that is to be wrapped,
- a wrapper feeding table (10), and

- means (4, 19, 23) for rotating the roll in the wrapper feeding direction and in a direction opposite to the feeding direction,

characterized of

5

- at least one first sensor (28) for indicating the wrapper end (31) that arrives on the wrapper feeding table,

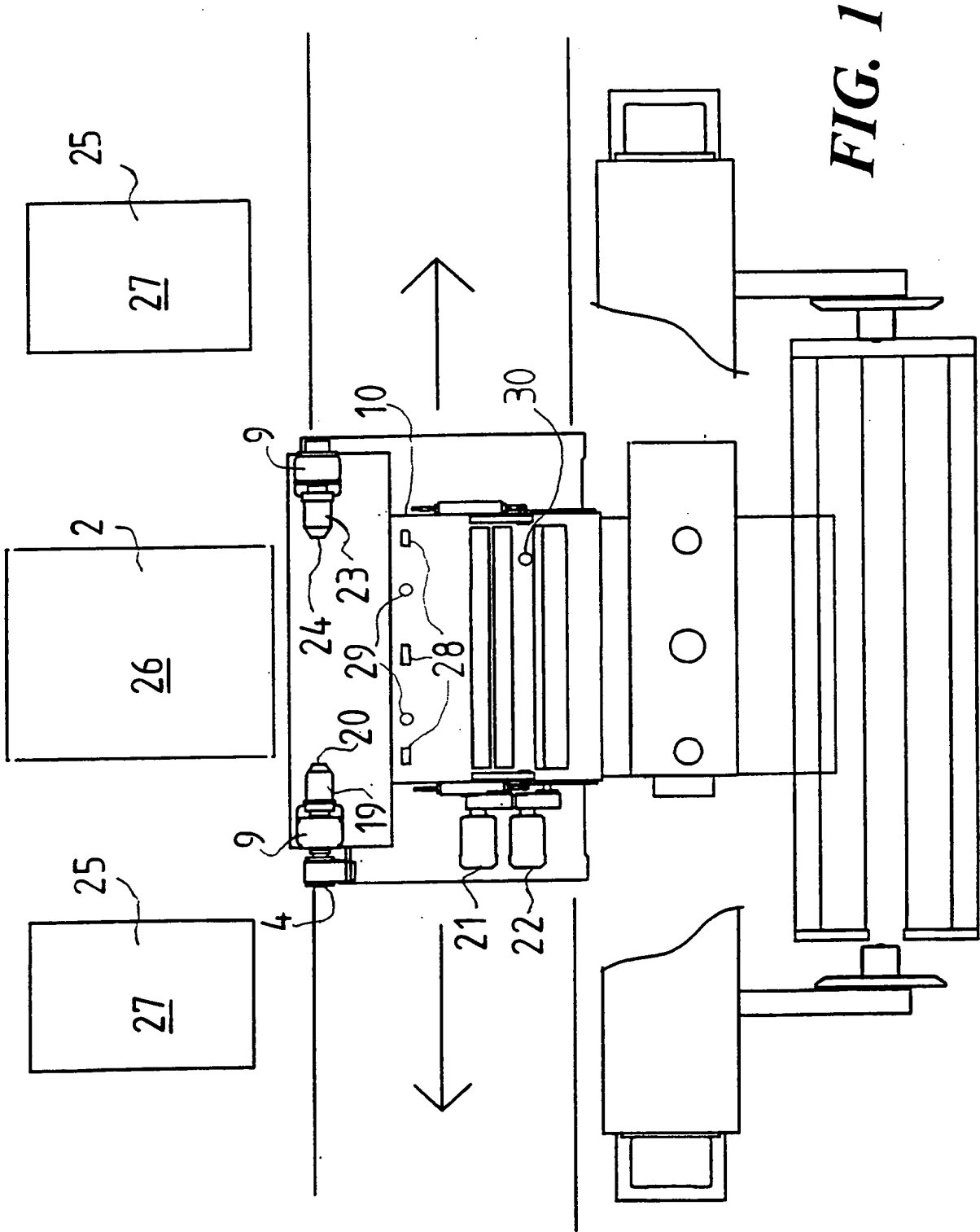
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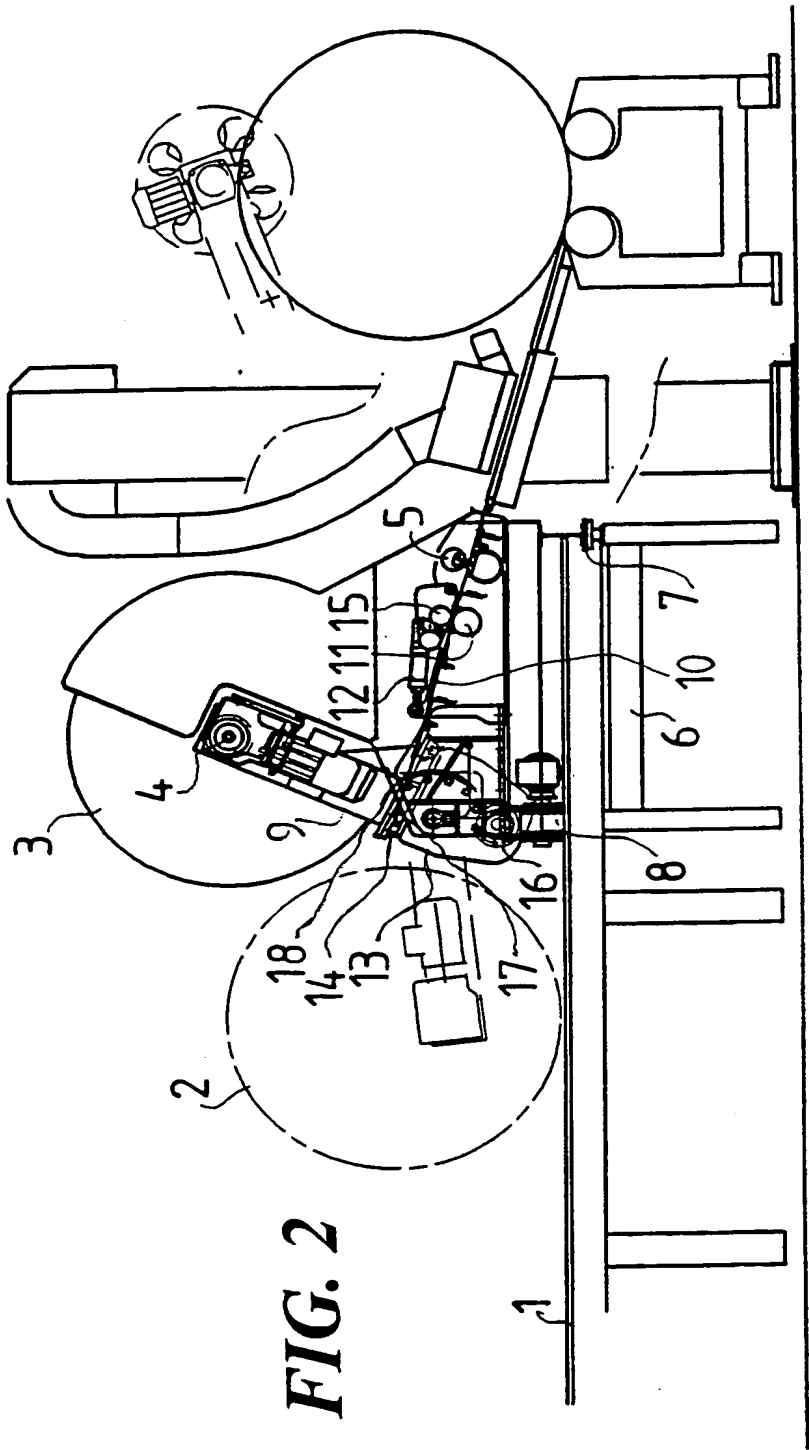
- at least one air nozzle for blowing air along the wrapper feeding table (10) for attaching the wrapper end to the table and for guiding it forward on the table, and

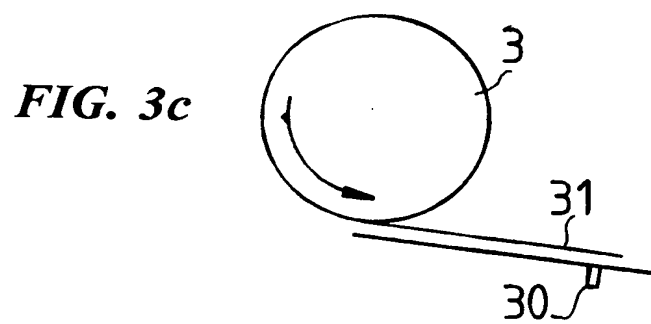
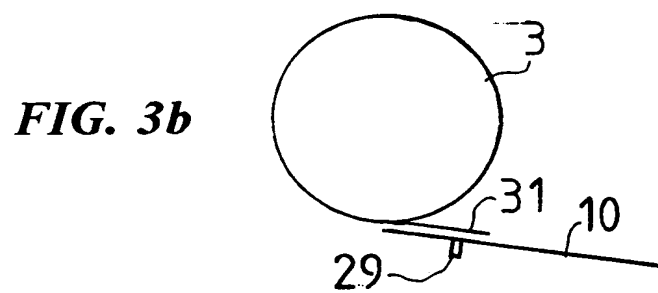
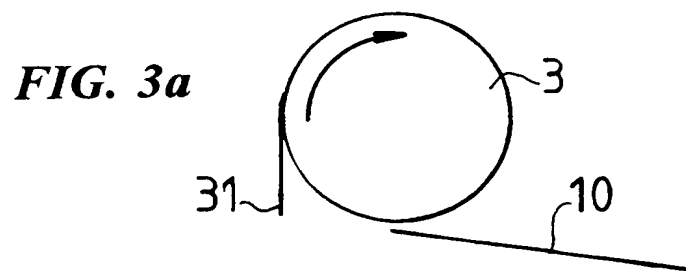
15

- at least one second sensor (30) for indicating the wrapper end that has passed the wrapper feeding members (11, 15).

5. An arrangement as claimed in claim 4, **characterized** in that the air nozzles (28) have been arranged in the table and there are several of them.







1
INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 99/00281

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: B65B 11/00 // B31B 1/10, B31B 1/12

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: B65B, B31B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI, EPODOC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4003527 A (SCHULZE), 18 January 1977 (18.01.77) --	1-5
A	SE 503181 C2 (VALMET PAPER MACHINERY INC), 15 April 1996 (15.04.96) --	1-5
A	US 5642600 A (HOOPER ET AL), 1 July 1997 (01.07.97) --	1-5
A	US 4914891 A (SUOLAHTI), 10 April 1990 (10.04.90) -- -----	1-5

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

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Date of the actual completion of the international search

5 July 1999

Date of mailing of the international search report

17 -07- 1999

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INTERNATIONAL SEARCH REPORT
Information on patent family members

01/06/99

International application No.

PCT/FI 99/00281

Patent document cited in search report			Publication date	Patent family member(s)	Publication date
US	4003527	A	18/01/77	NONE	
SE	503181	C2	15/04/96	CA 1313122 A	26/01/93
				CH 675234 A	14/09/90
				DE 3739104 A	01/06/88
				FI 864854 A	29/05/88
				FR 2607467 A	03/06/88
				GB 2197842 A,B	02/06/88
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				NO 173983 C	02/03/94
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				SE 0293352 T3	
				FI 78433 B,C	28/04/89
				FI 872358 A	28/11/88

PCT REQUEST

Val186pc

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0	For receiving Office use only	
0-1	International Application No.	
0-2	International Filing Date	
0-3	Name of receiving Office and "PCT International Application"	
0-4	Form - PCT/RO/101 PCT Request	
0-4-1	Prepared using	PCT-EASY Version 2.83 (updated 01.03.1999)
0-5	Petition The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty	
0-6	Receiving Office (specified by the applicant)	National Board of Patents and Registration (Finland) (RO/FI)
0-7	Applicant's or agent's file reference	Val186pc
I	Title of invention	METHOD OF AND ARRANGEMENT FOR THREADING OF A WRAPPER WEB INTO A NIP BETWEEN DRAWING ROLLS IN A WRAPPING DEVICE
II	Applicant	
II-1	This person is:	applicant only
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II-6	State of nationality	FI
II-7	State of residence	FI
II-8	Telephone No.	09-777 051
II-9	Facsimile No.	09 7770 5572
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III-1-6	State of nationality	FI
III-1-7	State of residence	FI

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III-2	Applicant and/or inventor	
III-2-1	This person is:	applicant and inventor
III-2-2	Applicant for	US only
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III-2-5	Address:	Ripistönkatu 27 FIN-15300 Lahti Finland
III-2-6	State of nationality	FI
III-2-7	State of residence	FI
IV-1	Agent or common representative; or address for correspondence The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:	agent
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IV-1-2	Address:	Itämerenkatu 3 B FIN-00180 Helsinki Finland
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IV-1-4	Facsimile No.	+358-9-68 595 610
IV-1-5	e-mail	seppo.laine@selpat.fi
V	Designation of States	
V-1	Regional Patent (other kinds of protection or treatment, if any, are specified between parentheses after the designation(s) concerned)	AP: GH GM KE LS MW SD SZ UG ZW and any other State which is a Contracting State of the Harare Protocol and of the PCT EA: AM AZ BY KG KZ MD RU TJ TM and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT EP: AT BE CH&LI CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE and any other State which is a Contracting State of the European Patent Convention and of the PCT OA: BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG and any other State which is a member State of OAPI and a Contracting State of the PCT
V-2	National Patent (other kinds of protection or treatment, if any, are specified between parentheses after the designation(s) concerned)	AE AL AM AT AU AZ BA BB BG BR BY CA CH&LI CN CU CZ DE DK EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT UA UG US UZ VN YU ZA ZW

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V-5	Precautionary Designation Statement In addition to the designations made under items V-1, V-2 and V-3, the applicant also makes under Rule 4.9(b) all designations which would be permitted under the PCT except any designation(s) of the State(s) indicated under item V-6 below. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit.		
V-6	Exclusion(s) from precautionary designations	NONE	
VI-1	Priority claim of earlier national application		
VI-1-1	Filing date	01 April 1998 (01.04.1998)	
VI-1-2	Number	980751	
VI-1-3	Country	FI	
VI-2	Priority document request The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) identified above as item(s):	VI-1	
VII-1	International Searching Authority Chosen	Swedish Patent Office (ISA/SE)	
VIII	Check list	number of sheets	electronic file(s) attached
VIII-1	Request	4	-
VIII-2	Description	6	-
VIII-3	Claims	2	-
VIII-4	Abstract	1	val186pc.txt
VIII-5	Drawings	3	-
VIII-7	TOTAL	16	
	Accompanying items	paper document(s) attached	electronic file(s) attached
VIII-8	Fee calculation sheet	✓	-
VIII-9	Separate signed power of attorney	✓	-
VIII-16	PCT-EASY diskette	-	diskette
VIII-17	Other (specified):	Copy of official action	-
VIII-18	Figure of the drawings which should accompany the abstract	2	
VIII-19	Language of filing of the international application	English	
IX-1	Signature of applicant or agent		
IX-1-1	Name	SEPPO LAINE OY	
IX-1-2	Name of signatory	Simo Hovi	

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10-1	Date of actual receipt of the purported international application	
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10-2	Drawings:	
10-2-1	Received	
10-2-2	Not received	
10-3	Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application	
10-4	Date of timely receipt of the required corrections under PCT Article 11(2)	
10-5	International Searching Authority	ISA/SE
10-6	Transmittal of search copy delayed until search fee is paid	

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11-1	Date of receipt of the record copy by the International Bureau	
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